Emergency Management Exercise Report
Tornado Preparedness Drill

Exercise Title: ***Tornado, Take Cover***

Exercise Date: March 18, 2008

Location: Site-Wide

Exercise Scope

Purpose:

Participate in statewide tornado preparedness drill organized by Virginia Department of Emergency Management and the National Weather Service.

Primary Objective:

Evaluate JLab procedures for responding to a National Weather Service tornado warning.

Supporting Objectives:

1. Evaluate effectiveness of Jefferson Lab's site-wide emergency alert system, utilizing the mass e-mail and text-paging functions.
2. Determine staff knowledge and use of weather-alert radios.
3. Determine staff knowledge of what to do during a tornado and where to take shelter.
4. Evaluate ability of supervisors and/or safety wardens to get their staff to safe areas.
5. Identify areas needing improvement in the Lab's tornado safety procedures.

Exercise Participants:

Planning Group Members: Walter Akers, Deborah Dowd, Dean Golembeski

Monitors:

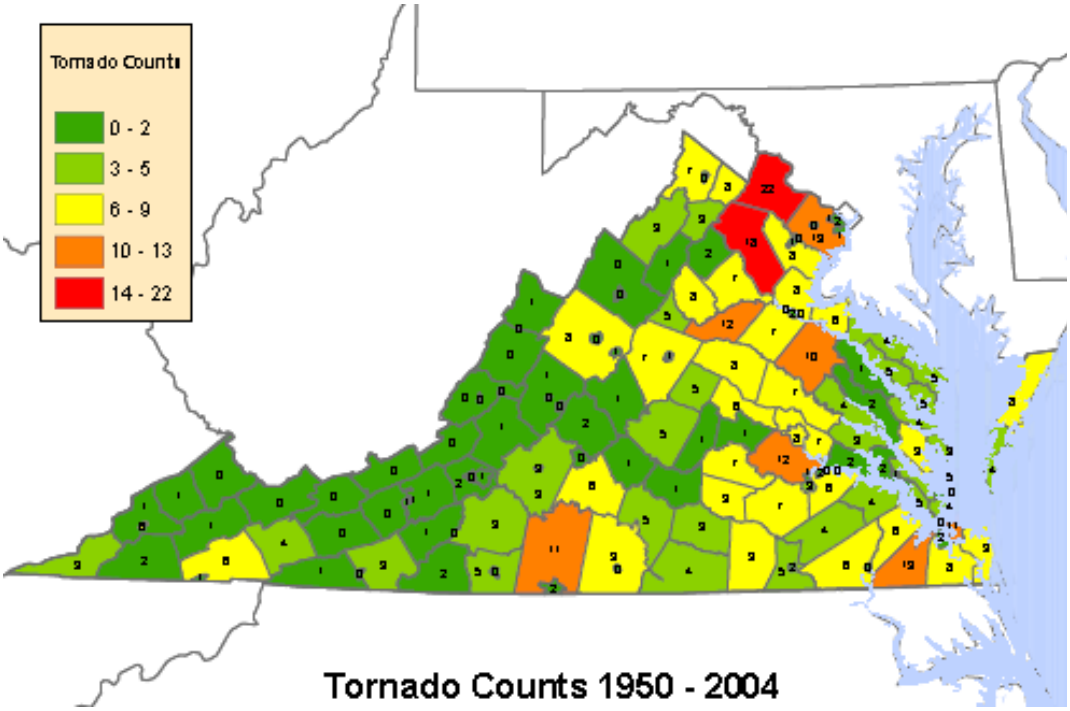
Walt Akers	Deborah Dowd	Stacy Miller
Greg Arnold	Steve Dutton	John Musson
Mark Augustine	Harry Fanning	Steve Neilson - DOE
Michael Beck	Theresa Foremaster	Leonard Page
Marti Bennett	Tom Hassler	Tom Powers
Mary Boggs	Judy Hill	Holly Snowburg
Dennis Brittin - TJSO	Patty Hunt - TJSO	Mark Stevens
Chris Bruhwel	John Kelly	Mary Beth Stewart
Deb Bruhwel	Mike Lewellen	Doug Tilles
Lorelei Carlson	Brett Lewis	Richard Walker
Buddy Carlton	Debbie Magaldi	David Williams
Kandice Carter	Dave McCay	Mark Wiseman
Jim Coleman	Marc McMullen	Mark Wissman
Christopher Curtis	Calvin Mealer	
Gina Dixon	Tina Menefee	

Monitor Locations:

ARC	Trailer 35	Bldg 89
CEBAF	Bldg 52	Bldg 90/EEL
FEL	Trailers 53 A,B, C	Trailer 94A
VARC	Bldg 58/Test Lab	Trailer 101B
Trailer 1A	Bldg 60//Guard House	SURA Residence Facility
Bldg. 2	Bldg 72	Trailer 34C
Bldg 8/CHL	Bldg 85	Bldg 87

Background:

Jefferson Lab's large campus with its multiple structures provides a challenge to tornado safety. At one end of the spectrum, the Lab's trailers and other portable structures are especially vulnerable to wind damage, providing little or no protection to occupants during a tornado. At the other extreme, the Lab's permanent structures are engineered to withstand winds up to 100 mph and provide areas where shelter is possible for large numbers of people.



The potential for a tornado to strike JLab is comparatively low. From 1950-2004, only five tornadoes were recorded in the Newport News area; three more since. An atypically strong storm in 2008 did considerable damage to residential areas along a swath from North Carolina through the Middle Peninsula region of Virginia.

Nonetheless, even a marginal tornado on the ground at Jefferson Lab has the potential for property damage and personal injury – the latter especially if the few minutes of advance warning of an approaching storm are not used effectively to alert personnel, and they know what to do.

Severe Weather Information for JLab Personnel:

Information on severe weather – including tornadoes – is found on the JLab Emergency Management website.

http://www.jlab.org/intralab/emergency/

http://www.jlab.org/intralab/emergency/weather/severe.html

Clicking on Jefferson Lab Tornado Information displays a document titled:

Tornadoes, JLab Buildings, and Seeking Safe Shelter

http://www.jlab.org/intralab/emergency/weather/tornadoes.pdf

…which includes the following information:

Office and storage trailers are highly vulnerable to tornadoes, and it is not safe to remain in them if a tornado is approaching.

If you are in an office trailer, and a tornado warning is issued, seek refuge immediately in one of these buildings:

Best Choices	Alternative Choices
Accelerator Tunnel*	Accelerator Exit Stairs
Experimental Halls* & lower corridor	Accelerator Access Buildings
CEBAF Center	MCC
Counting House	Building 87
ARC (Lower floors)	ARC Building 89
Test Lab	VARC

* May be inaccessible because of beam operations

Remember that the safest location in ***any*** building is an interior room or corridor, away from windows, skylights, and glass doors. Ground floors are preferable to upper floors. Stay out of auditoriums, atriums, or other locations with wide ceilings.

Exercise Synopsis:

At 9:45 a.m. on March 18, the National Weather Service issued a tone alert to NOAA weather radios as part of a statewide tornado preparedness drill. Jefferson Lab had pre-registered as a drill participant with the Virginia Department of Emergency Management, which annually conducts a statewide tornado drill for schools and businesses.

All JLab staff, including the Lab's safety wardens or others responsible for weather-alert radios, were provided advance notice and were instructed to monitor their radios for the emergency tone. Upon hearing the tone, individuals were to alert their co-workers and all were to evacuate their work areas to the nearest designated tornado shelter. They were also directed to the webpage that identified the preferred buildings in which to take shelter.

In addition, the Lab utilized its site-wide alert system to inform staff and users of the start of the drill. At 9:45 a.m., a message was distributed via e-mail and pagers.

The drill was scheduled to end at 9:50 a.m. All staff was informed of this prior to the commencement of the drill. Also, a message was delivered to e-mail and pagers via the Lab's site-wide alert system to mark the end of the drill.

The monitors observed actions of the people in their respective areas, queried random building occupants, and answered questions. (Providing answers about how to proceed is not normally part of an exercise monitor's duties. The exercise provided an opportunity to improve overall staff knowledge while evaluating baseline familiarity.) The compiled results are listed below.

Evacuation Procedures & Actions	Yes	No	NA
1. Was a tornado warning communicated to all occupants of the building?	60%	38%	2%
2. Did personnel evacuate the area(s) in a quick and orderly fashion?	84%	14%	2%
3. Were all hallways and exits clear of obstructions?	93%	4%	3%
4. Did all staff, users, and visitors evacuate in a timely manner to a designated shelter area?	73%	22%	5%
5. Were disabled staff and visitors assisted to the shelter area or to an appropriate room in the interior of the building?	10%	0%	90%
6. Were all elevators restricted to special needs persons?	0%	14%	86%
7. Did personnel know the location of the shelter area?	97%	3%	0%
8. Was the shelter close enough? (reached within 5 minutes)	100%	0%	0%
9. Was the shelter large enough to accommodate evacuees?	91%	0%	9%
10. Did everyone remain at the shelter assembly area until the all clear signal was given?	82%	11%	7%
11. Were stairways clear of obstructions?	58%	23%	19%
12. Are all tornado safe shelter areas clearly marked?	7%	89%	4%

These responses suggest areas for improvement in several aspects of the Lab's take-cover procedures.

- A more effective means to ensure all building occupants and those outdoors hear a take-cover alert when it is issued.
- Preferred take-cover areas are identified in a way such that they can be quickly located – even by someone not familiar with the building.
- Stairway obstructions of any kind are an impediment to quick egress and an unequivocal violation of the Life Safety Code and workplace safety requirements.

There was a post-exercise discussion and wrap-up session for all monitors and other interested parties. Comments, observations, concerns were solicited at this meeting, and the response was voluminous. They are compiled in the table below. Some comments or aspects of comments do not lend themselves to a specific action. These were variously opinions, broadly stated observations, or based upon assumptions that were partially inaccurate.

General Conclusions & Specific Lessons Learned

The number of people who reported not receiving the text page deserves follow-up. It raises questions: possible errors in the message transmission process, "dead zones" where pagers do not work reliably, or operator error (e.g. pager set to silent mode). One possible strategy would be to recruit a significant sample of pager users, distributed across the Lab, and ask them to confirm that they did or did not receive a page sent at a previously determined time.

Many people at JLab are unaware or have forgotten the Tornado, Take-Cover information that has been publicized in the past – including the location of the nearest refuge point. There is an obvious need to find opportunities and methods for making this information better known – and conduct a similar exercise periodically to reinforce the knowledge by practice.

Accounting for building occupants after an exercise or real emergency is problematic. Under OSHA standards and DOE Order 151.1C (*Emergency Management*), the Lab has this obligation. There are some practical challenges, however:

- Many JLab staff members have more than one routine work location.
- Some work "flexible" hours.
- There is no standard check-in–check-out procedure from a given work location.
- Anyone not accounted for at the building muster point has to be "tracked down." The time required to do this makes it impossible to quickly inform the incident commander (a fire department battalion chief, for example) that there is no one left inside. This information has major implications for their tactics: interior search and rescue versus suppress the fire with minimum risk to fire personnel.
- One common way this requirement is met is to place expectations on designated people to check offices/cubicles on their way out to ensure someone isn't left behind. A term of art for this person is *"Building (or Floor) Fire Wardens"*
- In some JLab settings, this duty, if done thoroughly, could take several minutes – delaying the checker's own evacuation.

The large number of participants (monitors) generated a lot of comments. It would have been useful to have a focused questionnaire with scored responses to a previously agreed-to set of questions. This would have facilitated analysis of the feedback and made systemic problems more discernable.

JLab buildings, as is the case with most other facilities in this region, were not designed to provide quick access to a dedicated, protective area, constructed to withstand extreme wind events. This is one of the reasons the site is evacuated before a hurricane strike. The Lab's responsibility is to make best use of the resources at hand and to inform building occupants how to locate the nearest, most protected area in the event of a tornado. JLab's procedures and practices are derived from recommendations from authoritative sources.

Typical Instructions for Seeking Safe Refuge from an Approaching Tornado

The best protection in a tornado is usually an underground area. If an underground area is not available, consider:

1. Small interior rooms on the lowest floor and without windows
2. Hallways on the lowest floor away from doors and windows
3. Rooms constructed with reinforced concrete, brick or block with no windows and a heavy concrete floor or roof system overhead
4. Protected areas away from doors and windows

Note: Auditoriums, cafeterias and gymnasiums that are covered with a flat, wide-span roof are not considered safe.

Make plans for evacuating personnel away from lightweight modular offices or mobile home-size buildings. These structures offer no protection from tornadoes.

http://www.fema.gov/library/biz3.shtm

If a Tornado is Headed Your Way

Shelter immediately in the nearest substantial building. Go to the building's basement. If there is no basement, move to a small, windowless interior room such as a closet, bathroom or interior hall on the lowest level of the building. Protect your body from flying debris with a heavy blanket or pillows.

Take precautions if you can not get to a substantial building. If you are in:

- Open buildings (shopping malls, gymnasiums, or civic centers): Try to get into the restroom or an interior hallway. If there is no time to go anywhere else, seek shelter right where you are. Try to get up against something that will support or deflect falling debris. Protect your head by covering it with your arms.
- Automobiles: Get out of your vehicle and try to find shelter inside a sturdy building. A culvert or ditch can provide shelter if a substantial building is not nearby — lie down flat and cover your head with your hands. Do not take shelter under a highway overpass or bridge, because debris could get blown under them or the structures themselves could be destroyed.
- Outdoors: Try to find shelter immediately in the nearest substantial building. If no buildings are close, lie down flat in a ditch or depression and cover your head with your hands.
- Mobile homes: Do not stay in mobile homes. You should leave immediately and seek shelter inside a nearby sturdy building or lie down in a ditch away from your home, covering your head with your hands. Mobile homes are extremely unsafe during tornadoes.

http://www.vaemergency.com/threats/tornado/tornrespond.cfm

Exhibit 1

Recent Bulletin from the Virginia Department of Emergency Management:

Emergency Management UPDATE

Issued Biweekly for the Virginia Emergency Management Community

June 18, 2008

Virginia emergency manager testifies before Congress

Capt. Jim Judkins, emergency management coordinator for the city of Suffolk, recently testified before the U.S. House of Representatives' Transportation and Infrastructure Committee about improvements to the Emergency Alert System. The "Assuring Public Alert Systems Work to Warn American Citizens of Natural and Terrorist Disasters" hearing offered several witnesses the opportunity to talk about the way the system currently works, which requires residents in an affected area to actively listen to local television and radio stations or to pre-register with a service to receive alerts. The Committee is investigating possible ways to alert residents who are not listening for alerts and who haven't registered to receive them in any other way.

Judkins testified on behalf of the survivors of the April 28 tornadoes in Suffolk (where there were no fatalities) that EAS alerts saved many lives:

"In my 28-plus years [of] experience, I find there is no one perfect alert system. Sirens fail, either mechanically or [people do not hear them] due to the use of headphones on personal listening devices. Weather radios are turned off for unexplained reasons. More and more people are watching or listening to satellite radio and television where local warnings are not available. Subscriber-based weather warning services require pre-registering. My grandmother once said, 'You can lead a mule to water but you can't force him to drink.' The same thing applies to warning systems. Each of us has a responsibility to our families for their safety and well-being. That responsibility includes knowing your community's warning system and having a method to receive emergency messages. Three simple phrases say it all. Get a kit, have a plan, and stay informed."

Judkins' entire testimony and that of each witness, including representatives from the International Association of Emergency Managers, the Federal Communications Commission, FEMA, and the National Emergency Management Association, are available at http://www.iaem.com/publications/news/news.htm#hearing060408.

Exhibit 2

Governor's Proclamation

By virtue of the authority vested by the Constitution in the Governor of the Commonwealth of Virginia, there is hereby officially recognized:

Tornado Preparedness Day, 2008

WHEREAS, tornadoes are capable of forming with little or no warning and their destructive power can cause significant property damage and loss of life wherever they may touch down; and

WHEREAS, the loss of life and destruction of property caused by tornadoes is often reduced significantly when appropriate precautionary measures are taken before, during and after their occurrence; and

WHEREAS, on Tornado Preparedness Day, the Virginia Department of Emergency Management, local emergency offices and the National Weather Service provide tornado safety awareness tips to citizens throughout the Commonwealth, including important lifesaving procedures that should be used in the event of a tornado; and

WHEREAS, it is important for all Virginians to know where to seek shelter during a tornado whether at home, at work, at school or elsewhere; and

WHEREAS, the Virginia Department of Emergency Management encourages schools, businesses and families to participate in a test tornado drill to be conducted by Emergency Alert Systems and broadcast by NOAA Weather Radio on March 18, 2008, at 9:45 a.m.;

NOW, THEREFORE, I, Timothy M. Kaine, do hereby recognize March 18, 2008, as TORNADO PREPAREDNESS DAY in the COMMONWEALTH OF VIRGINIA, and I call this observance to the attention of all our citizens.